平成 20 年度　第 2 回 VBL 特別講演会

演題：New amorphous nanocrystalline compounds and high strength aluminium alloys produced by mechanical alloying and hot pressing vacuum.

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場所：工学部　大会議室

講演概要

Unique properties of amorphous materials are discussed in view of a high strength, toughness and elastic strain, but a low plasticity. Concepts existing in literature to manufacture composites allowing to increase plasticity by increasing the amount of crystalline material are discussed. The principle of experimental studies in Krakow done in the frame of the European project will be shown. Amorphous powders were obtained from easy glass forming alloys of composition Zr17Cu29Ni19Ti25 (at%) by ball milling and the presence of amorphous structure was confirmed. However, HRTEM technique allowed to identify nanocrystalline inclusions as $Cu_{12}NiTi_7$. Hot pressing of ball milled amorphous powders with 20 and 40% of nanocrystalline iron or silver additions improves plasticity on expense of the compression strain which was near 1800 MPa in amorphous-40% nano-Fe composites and only close to 700 MPa in amorphous-40% nano-Ag composites. Powder of composition Ni60Nb20Zr20 (at%) was also Hot pressed from ball milled amorphous powders with 20% of nanocrystalline iron or silver. HRTEM and HAADF studies allowed to identify (similarly as in ball milled powders) nanocrystalline inclusions of Ni_3Zr or Nb_3Ni_{17}, within the amorphous part of composites. The attained compression stress is about 700 MPa at plastic deformation of about 2% what is lower than expected due to formation brittle intermediate layer interface.